

Deliverable #3

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 09/2022) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 12).



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1. Executive Summary

An agreement between ICCAT and AquaBioTech Ltd based in Malta was set up to carry out sampling of Atlantic bluefin tuna (BFT) during harvesting of BFT caged in farms in Malta (600 fish in total).

A total of **697 fish** were sampled. BFT were sampled from cages containing the fish from the following areas:

- Tyrrhenian Sea (TY),
- Central Mediterranean Sea (MA).

This year the harvesting period for the TY fish started earlier than the MA, and we sampled a total of **352 TY** fish and **346** of MA. No delays were experienced in the sampling process of the targeted fish.

The BFT sampled varied in size from 121 to 316 cm in length (SFL) although over 85% were above 200 cm in length (SFL).

As the case for other sampling years, there were significant issues with the collection of otoliths and spines. This is related to the harvesting and fish processing operations on the farm and aboard the processing vessels. The position where the fish is shot in the head and the cutting off the head sometimes destroys the otoliths. Regarding the spines, some were occasionally lost during processing. Several fish more than had been requested in the agreement were sampled on board the processing vessels.

The samples collected were **597 with a full set of samples** with Biometric data (SFL, CFL and LD1) and biological data (Otolith/s (1or 2), spine and muscle). For TY fish there were **291 full sets of samples** and **MA fish there were 306 full sets of samples**.

Apart from the biometric data (which included straight fork length (SFL), curved fork length (CFL), first dorsal length (LD1) and whole weight (RWT), 619 whole pair or single otoliths were extracted as well as 694 genetic samples (muscle) and 666 spines.

2. The Agreement

As per the following Agreement between ICCAT and AquaBioTech Ltd:

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 09/2022) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 12).

AquaBioTech Ltd has the following address in Malta:

- AquaBioTech Ltd, referred to as ABT, whose registered office is at 'Central Complex', Triq in-Naggar, Mosta MST1761, Malta.

3. Aim of the work

The objective of the Agreement was to obtain adult Atlantic bluefin tuna, *Thunnus thynnus*, (BFT) biometric data and samples as follows:

- i) Straight fork length (SFL) in cm.
- ii) Curved fork length (CFL) in cm.
- iii) Length to the first dorsal (LD₁) in cm.
- iv) Total weight (round weight, RWT) in kg.
- v) Sex identification.
- vi) Otoliths sampling.
- vii) Tissue sampling for genetic analysis.
- viii) First dorsal spine.

The procedures which were followed during the sampling on board the processing vessel were those indicated in the “SAMPLING PROTOCOLS FOR THE GBYP BIOLOGICAL SAMPLING (Last updated: March 2022)”.

Table 1 below indicates the target number of BFT which were required by the Agreement and subsequent communications to be sampled during harvesting from the farms from fish caught from the following selected areas:

Table 1: Target number of bluefin tuna required on the agreement.

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
Number of fish	300	300

Full cooperation was provided by the farms and their operators during the actual sampling of BFT.

4. Sampling on board the processing vessels

Biometrics of BFT was carried out on board the processing vessels, working in conjunction with the harvesting activities being carried out by each of the BFT farms.

The actual process of harvesting starts when the BFT are first shot in the cages, lifted out of the water, and taken to the processing vessel in groups (not individually) whereby they are subsequently processed by the crew.

The first step on board the processing vessel normally involves weighing of the fish, followed by cutting off the head and tail followed by further cutting into loins or fillets after which they are then frozen.

Biometrics and tagging of heads were carried out before the fish heads were cut off. The SFL, CFL and LD1 of each fish were taken, each head and spine tagged individually, and the weight of each fish recorded prior to the whole fish moving on to the next part of the processing (which involved cutting off the head and tail), during which the sex of each tagged fish was identified. Tagged heads were then separated from untagged heads and moved to a dedicated area of the vessel where a field laboratory area was set up to conduct otoliths extraction and cleaning, and muscle samples collection. Lastly, tagged spines were separated from untagged spines in the later parts of fish processing, collected and brought to a separate area where the first dorsal spine was extracted from the separated first dorsal fin.

5. Data and samples collected

Samples were to be taken from fish caught in the Tyrrhenian Sea and Central Mediterranean Sea. Consequently, data and samples were collected from BFT caught during the purse seine fishing season in the following areas:

- Western Mediterranean, Tyrrhenian Sea (TY),
- Central Mediterranean Sea, South of Malta (MA),

The following numbers of fish (Table. 2) have been sampled on board the processing vessel for collection of biometric data, otoliths, tissue, and spine samples for analysis:

Table 2: Number of tagged fish

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
Number of fish	351	346

Table. 3 below summarises the ranges of straight fork length SFLs and total round weights RWTs of the BFT sampled on board the processing vessels, providing the range of each and the average for the whole sampling group:

Table 3: Ranges of Straight fork length SFLs and total weight RWTs of the BFT at both regions

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
SFL (cm)	Range: 121 – 316 Average: 219.15	Range: 172 – 298 Average: 223.26
RWT (kg)	Range: 42 - 489 Average: 237.57	Range: 107 - 497 Average: 251.56

Figure.1 below summarises the size distribution (SFL) in 10 cm length classes of the BFT sampled from each of the areas (Tyrrhenian Sea, TY, South of Malta, MA).

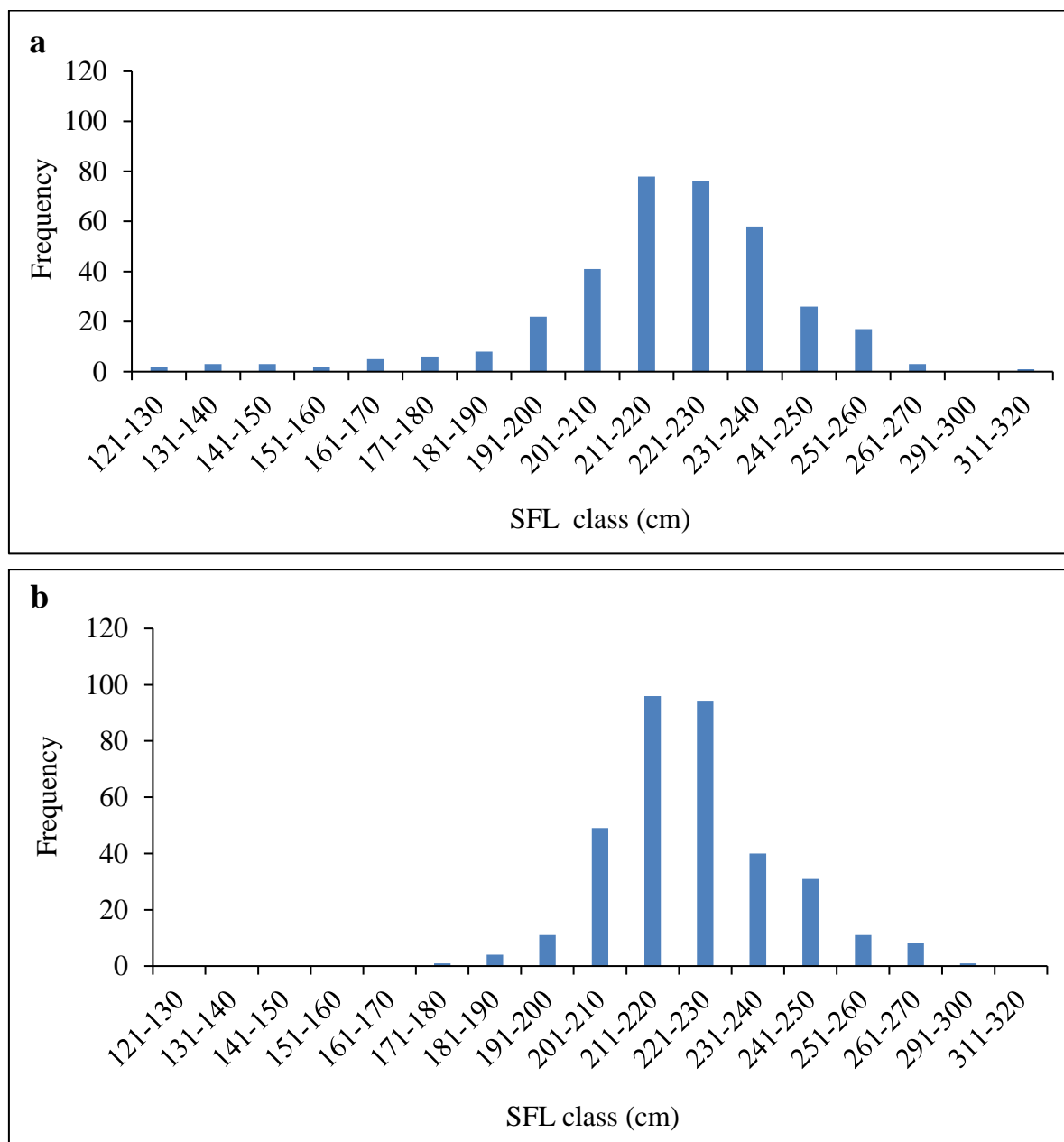


Figure. 1: Distribution of Straight fork length (SFL) classes of the blue fin tuna sampled from each of the areas a: Tyrrhenian Sea, b: Central Mediterranean, MA.

Heads were cut open to enable extraction of otoliths and sampling of muscle for the purpose of genetic analysis. Collection of otolith/s (pair, single) were problematic in a significant number of heads collected from the farms during the processing of the harvested BFT. This was due to two reasons: firstly, the central position of the shot in the head which stuns the fish prior to removal from the cage, and secondly, the cut carried out during the processing (carried out by staff during the processing on board the processing boat) at the point where

the head is removed. In many cases, the otolith/s were broken or completely missing.

The Table.4 below summarises the collection of data and samples collected:

Table 4: Number of biometric parameters, otoliths, genetic and spines samples collected at both regions.

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
SFL	351	346
CFL	351	346
LD₁	351	346
RWT	351	346
Sex	351	346
Otoliths (1 or 2)	314	305
Muscle	348	346
Spine	321	345

6. Acknowledgements

This work has been carried out under the ICCAT Atlantic-Wide Research Programme for Bluefin Tuna (GBYP), which is funded by the European Union, several ICCAT CPCs, the ICCAT Secretariat, and other entities (see <https://www.iccat.int/gbyp/en/overview.asp>). The content of this paper does not necessarily reflect ICCAT's point of view or that of any of the other sponsors, who carry no responsibility. In addition, it does not indicate the Commission's future policy in this area.



Dr. Simeon Deguara
CRO Director
AquaBioTech Group
www.aquabt.com